

Standard Operating Procedure for Electronic Field Information Recording

LG101

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STANDARD OPERATING PROCEDURE FOR ELECTRONIC FIELD INFORMATION RECORDING

1.0 INTRODUCTION

- 1.1 Central to GLNPO's information management system is a computerized database system to house environmental monitoring data. The system was developed and initially implemented to support the Lake Michigan Mass Balance Study (LMMB) and is now supporting aspects of GLNPO's Base monitoring program and other special studies. The Oracle-based system, the Great Lakes Environmental Monitoring Database (GLEND A), was developed to provide data entry, storage, access, and analysis capabilities to meet the needs of GLNPO staff, LMMB study modelers, and other potential users of Great Lakes data. During the Summer 2000 surveys, GLNPO began phasing in the use of an onboard data entry system, the GLEND A remote data entry tool, designed to capture survey data into the database on a daily basis. This system, available on the *R/V Lake Guardian* and at GLNPO headquarters, is designed to include real-time data entry checks to prevent analysts or technical staff from entering 'nonsensical' values. The tool is based on a windows interface to the GLEND A database and is intended to allow the easy input of field data from prescribed field information recording forms (Appendix H). The items from the recording forms are copied to corresponding locations on the windows input sheets. Because considerable latitude is allowed on several of the field names in the database, this document is intended to provide a guide to facilitate consistency of data entry, at least for GLNPO generated data. For information on entering data into GLEND A, see the *User's Manual for the Remote Data Entry Tool* located in Appendix J of this manual.

2.0 INFORMATION RECORDING AND DEFINITIONS

2.1 SURVEY

- 2.1.1 *Survey* or *Trip* will normally be a survey of one lake, unless the survey is under the direction of more than one chief scientist, in which case, there will be a survey for each Chief Scientist. The Survey name should follow the past convention of the first two characters defining the lake and the second two defining the year and the fifth and sixth character defining the season and the run. ER0211 is Lake Erie 2002 spring run 1, ER02DO3 is the third DO survey of Lake Erie in 2002.
- 2.1.2 The *Chief Survey Scientist* is the Chief Scientist on that survey.
- 2.1.3 The *Survey Name* reflects the name and date of the survey, for example, the Lake Erie Limnology Survey March 2002.
- 2.1.4 The *Vessel Name* could be characterized with a variety of names such as Lake Guardian, R/V Lake Guardian, R/V Guardian, Guardian, or several other combinations - use *R/V Lake Guardian*.

2.1.5 *Start Date*, *Start Time*, *Stop Date*, and *Stop Time* are self-explanatory.

2.1.6 *Survey Description* provides a chance to enter the number of water stations sampled for chemistry and biota, SeaBird (remote water data collection) and the number of benthos stations and other activities being performed on the survey. This description is limited to 255 characters.

2.2 STATION VISIT

2.2.1 The *VisitID* assigns a unique identifier to each visit of a geographical location, for example, E009O02. The first character is the first letter of the lake name, the next three characters are the station number, the fifth character is the month that the survey starts: Jan, Feb, Mar, Apr, maY, jUn, juL, auG, Sep, Oct, Nov, Dec. and the last two digits represent the year.

2.2.2 For the *StationID* the first two characters are the first two characters of the lake name. The next two or three characters are the station number.

2.2.3 *PilotID* is an identifier for the officer on the bridge at arrival at the station. The GLENDa Field Data Entry Tool provides a list of allowable entries, assuming new personnel do not arrive during the seasonal cruise.

2.2.4 The *Latitude* and *Longitude* are entered in degrees and minutes.

2.2.5 The *Station Depth* is a sonar depth reading in meters.

2.2.6 *Water Temperature* and *Air Temperature* are readings from the transducers attached to the vessel, and are in degrees Centigrade. The so-called bucket temperature taken from the Rosette is recorded on the Rosette sheet rather than on the station visit sheet.

2.2.7 The other weather readings and observations are obvious from the recording form and/or the data entry tool. If weather is something other than one of the options in the pull-down menu, it can be entered in the remarks column.

2.3 SAMPLING DOCUMENTATION SHEETS (Rosette, Ponar, Zooplankton)

2.3.1 The *SurveyID*, *VisitID*, and *StationID* are normally pre-loaded on the sampling sheets to correspond to the SurveyID and VisitID sheets. Likewise, the *SampleID*, *Depth code*, *QCID code*, *Sample type*, and *Mesh size* will be pre-loaded according to the survey plan.

2.4 ROSETTE SAMPLING DATA

2.4.1 See "Sampling Documentation Sheets" above. The *Sample Date/Time* should be the time that sampling is initiated (i.e., when the first bottle is triggered). If a second cast is necessary, a second Sample date/time is recorded for the beginning of that sampling cast.

2.4.2 The *EBT Operator* is the person actually operating the Rosette, whether it is the marine technician or the EPA Chief Scientist.

- 2.4.3 *MethodID* is LG 200 unless the water sampling is being performed with a hydrographic line in which case the *MethodID* is LG 201.
- 2.4.4 *InstrumentID* is an identifier for the remote sensor array used to collect water temperature and other parameters at depths. The identifier specifies the particular instrument and the date that it was calibrated. 911F02 or 25M02 would indicate the SeaBird 911 calibrated in February 2002 or the SeaBird 25 calibrated in March 2002 respectively.
- 2.4.5 The *Total Depth* is taken from the SeaBird; either the depth when the seabird touched bottom or the B- depth plus the altimeter reading.
- 2.4.6 *Surface Water Temperature* is taken with the YSI LCD thermometer immediately after the Rosette or Niskin bottle is brought on deck by the assistant sampler. The EBT operator verifies that it is within 0.2°C of the EBT reading.
- 2.4.7 The exact depths and sample information of each individual sample collected for preparation of the integrated sample should be recorded on the Rosette Sampling Data Field Information Recording Form (Appendix H). The sample depths and temperatures are recorded by the EBT operator (person operating the Rosette) as the samples are collected. The user also enters the Rosette bottle number in the remarks column and indicates which depths are used for the integrated sample. The assistant sampler may facilitate these operations by recording the information on the Rosette Sampling Data Field Information Recording Form as the EBT operator reads it off the screen.

2.5 PONAR GRAB SAMPLING DATA

- 2.5.1 See “Sampling Documentation Sheets” above. The *Sample date/time* is the time that the first sample is collected. The *Water depth* is obtained from the EBT operator prior to sampling.

2.6 ZOOPLANKTON SAMPLING & SECCHI DISK DATA

- 2.6.1 See “Sampling Documentation Sheets” above. The *Sample date/time* of the first net tow is recorded along with the person performing the tows. For each tow, the *sample depth* (the depth to which the ring is lowered), the *flow meter reading*, and an estimate of the *net angle* are recorded. If the sampling is being performed between sunrise plus one hour and one hour before sunset, a *Secchi disk reading* is performed and recorded.

2.7 LISTS OF ACCEPTABLE GLEND A CODES (APPENDIX I)

- 2.7.1 Appendix I, *Lists of Acceptable GLEND A Codes*, contains a subset of acceptable codes including lists of acceptable field remark, lab remark, and quality control sample identifier codes used in GLEND A. Survey participants and data users should refer to these GLEND A codes when entering data into GLEND A or reviewing data housed within GLEND A. A complete list of acceptable GLEND A codes is available from the GLEND A Manager.

3.0 SAMPLE IDENTIFICATION AND LABELING

3.1 *Sample definition and numbering:* Prior to each survey, the Technical Lead for Board Chemistry will create and assign unique sample numbers for each sample to be collected during the survey. This approach ensures that there is no confusion among scientists and staff during data gathering, data reporting, or data evaluation concerning sample identity. For the purposes of the Water Quality Surveys, a sample is defined as a discrete volume of water or sediment collected with a particular type of device at a particular site and depth on a given day. A sample may then be aliquotted into several fractions and bottles for analysis of different parameters. Each of these bottles is given the same sample number. Field duplicates and blanks are treated as separate samples and, therefore, assigned different sample numbers.

3.2 *Pre-labeled bottles and containers:* Prior to each survey, the Board Chemistry Technical Lead creates computer-generated sample labels that are pre-affixed to each cubitainer and bottle that will be used to store samples in the field. Copies of these labels also will be affixed to the cubitainer or bottle cap to serve as a back up means of identification should the labels come off during sample processing. To further ensure that samples are properly identified and handled in the field, each sample label will be color coded to indicate the preservation and filtration requirements needed for each sample bottle (i.e., yellow labels are used for total nutrient aliquots requiring preservation with sulfuric acid, orange labels are used for total dissolved nutrients which are filtered and preserved with sulfuric acid, and white labels are used for unpreserved sample aliquots).

Prior to arrival at a sampling station, the labels for the associated samples will be segregated and applied to the sampling bottles. When sample bottling and preservation are completed, a record of the numbers on the labels used will be made on analysis request sheets. The analysis request sheet will be used to track samples through the processing and analysis.

3.3 *Label information:* Each sample label will contain the following information:

- A 9-digit sample number (coded as described below) that is unique to the sampling date, location, depth and sampling device
- Lake Station number
- Survey data
- Preservation used
- Parameter to be measured

3.4 *Sample numbering scheme:* Each sample number is coded in the following format to provide summary level information about the sample:

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_____ Year	_____ Sample Device	_____ Lake	_____ Series	_____ Sample Type	_____ Sample Number
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Valid codes for the sample numbers are as follows.

Year: two digit years such as "00," "01," "02"

Division: G for GLNPO

Lake: A = Michigan; B = Huron; C = Erie; D = Connecting Channels; E = Ontario;
S = Superior

Series: Number sequence

Sample Type: S = Primary; I = Integrated; D = Duplicate; R = Field Blank; C = Duplicated Analysis; X = Spike; and B = Laboratory Blank.

In addition, samples that are collected for production of the integrated sample only (i.e., they are not otherwise collected for determination of study parameters but solely for production of the integrated sample), will be identified with an a, b, or c at the end of the sample number.

- 3.5 *Station Identification:* To avoid confusion regarding station identification between lakes (i.e., to distinguish between Lake Erie Station 61 and Lake Huron Station 61), GLNPO assigns a "Station ID Number" to each station visited. The Station ID number consists of the first two letters of the lake name followed by a space and the 2-digit station number (a leading zero is added to single digit station IDs). For example, Lake Erie Station 61 is assigned the Station ID "ER 61" and Lake Huron Station 61 is "HU 61." Historically, a different numbering system was used for Lake Superior, but to improve consistency, sampling stations for Lake Superior are now numbered SU 01 - SU 19.
- 3.6 *Visit Identification Numbers:* GLNPO also assigns unique "Visit ID" numbers to differentiate sampling activities conducted at a single site on different dates (or visits). The Visit ID number consists of the first letter of the lake name followed by the 3-digit station ID (leading zeros are added for one or two digit station IDs) followed by the first letter of the month the survey began and the last two digits of the survey year. In order to give each month a unique identifier, Y is for May, U is for June, L is for July and G is for August. For example, if Lake Erie Station 61 is visited in the spring of 2000, and the spring surveys begin in April, the Visit ID assigned to this station on the spring cruise is "E061A00."
- 3.7 *Time definitions:* While surveys are in progress, a single "ship time" is used throughout the survey. The ship's Captain establishes ship time. Ship time and its associated time zone are always written in a standard prominent location. The survey participants are required to synchronize their watches with "ship time" when they board ship. When recording time with associated survey data, survey participants are responsible for recording and entering the time as ship time and also entering the correlating time zone (e.g., EST, EDT, CST, CDT, etc.) on the data sheets and within GLENDA. Because the world standard for time keeping is Greenwich Mean Time (GMT), all electronic measurements made on the bridge are captured in GMT. To facilitate conversion between GMT and ship time, the "mate of the watch" also records the "correction factor" (e.g., 5 hours) for converting GMT to the time zone standard (e.g., eastern daylight time, central standard time, etc.) used at the

ship location. The correction factor is entered into GLENDa along with the actual time measurements recorded by scientists and bridge staff when the data are uploaded to the database. Once in GLENDa, data users can specify the time standard they need when retrieving data.

4.0 DATA ENTRY ACCURACY CHECK

- 4.1 For the bridge data, the Officer in Charge shall be responsible for reviewing the previous watch entries in the Ships' Log, GLENDa Station Information Field Recording Form and the GLENDa database to assure correctness of the data entered. Errors noted shall be corrected immediately.

5.0 DATA MANAGEMENT

- 5.1 For each staffing period, the Chief Scientist must assure that all data has been collected, analyzed, and entered into the data entry tool. A Data Flow Diagram is provided in Figure 1 and presents the data management process for data collection and data verification for the WQS. Hard-copy Field Information Recording Forms (Appendix H) are used to record data as it is being collected during the survey. The data is then entered into the GLENDa shipboard Remote Data Entry Tool (see Appendix J for entry instructions). Output files from the Remote Data Entry Tool are created at the end of each survey leg and the Chief Scientist delivers them to the GLENDa Database Manager. If the tool is not functioning properly, the data can be entered into Excel electronic files, which are a soft-copy version of the recording forms in Appendix H, as a back-up to the tool. If this back-up option is used, the data are entered into the Remote Data Entry Tool from these electronic files at GLNPO headquarters or onboard the ship if the Remote Data Entry Tool begins to function during the survey leg. Once the data are in the Remote Data Entry Tool they are uploaded to GLENDa as unverified data upon completion of each survey.
- 5.2 The Chief Scientist is responsible for transferring the original field information recording forms to the QA Team at GLNPO (Marvin Palmer or his designee) for internal quality control checks. The QA Team conducts checks of the recording forms against the data that has been uploaded to GLENDa and addresses any data discrepancies. After completing these checks and resolving all discrepancies, the QA Team transfers the forms to the Environmental Monitoring and Indicators Team for storage in the designated file cabinet at GLNPO. The pertinent Technical Lead conducts a final review of the data and notifies the Database Manager of approval. The Database Manager then finalizes the dataset as Version 1 and makes the data available. For each dataset, the status of this data management process is tracked by the QA Team on the Data Status Tracking Sheet (Appendix N).
- 5.3 The Chief Scientist must assure that a copy of the hard-copy field information recording forms is made and placed in the onboard designated file cabinet at the end of each survey leg. The Chief Scientist assures that an electronic copy of all soft-copy field information recording forms is made and transferred to the database manager at GLNPO (Ken Klewin) for storage. The Chief Scientist also must assure that SeaBird data files are processed at the end of each survey leg and returned to the database manager for storage. These items are included on the Chief Scientist List of Roles and Responsibilities (Appendix L).
- 5.4 A process also has been developed for correcting errors identified in verified data in GLENDa and is illustrated in Figure 2. Once a data error is identified, a Data Discrepancy Form (Appendix O) is

completed and submitted to the Quality Assurance Manager and Database Manager. Data are revised in GLENDA and the revisions are verified as correct by the QA Team. The pertinent Technical Lead also conducts a final review and notifies the Database Manager of approval. The Database Manager then finalizes the dataset as the subsequent version and makes the data available.